MI-97300C
GEK-18050C

INSTRUCTIONS

OVERSPEED-DERATER LINKS
PARTS 132X1273, 132X1350 AND 132X1500

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DESCRIPTION

The overspeed-derater link controls the diesel engine in the event of an engine overspeed or excessive intake-air temperature condition.

The link is comprised of two steel, cylindrical casings (see Figs. 2, 3 or 4). The outer casing is a cylinder which is open at the bottom end and closed at the top by means of a steel cover secured by a spring-steel retaining (snap) ring. The inner casing is a cylinder with the top end open and the bottom end closed. The inner casing also contains an actuator cup (see Figs. 2, 3 or 4) which contains three wax-filled thermal actuators and an actuator spring located in the space between the outer surface of the actuator cup and the inside surface of the inner casing. The outside surface of the inner casing has two machined, annular grooves into which ring seals are fitted to provide a sliding, close tolerance fit to the inside surface of the outer casing. The skirt of the inner casing is machined to provide an oil space, or recess, between the inner and outer casings.

FIG. 1, E-21096

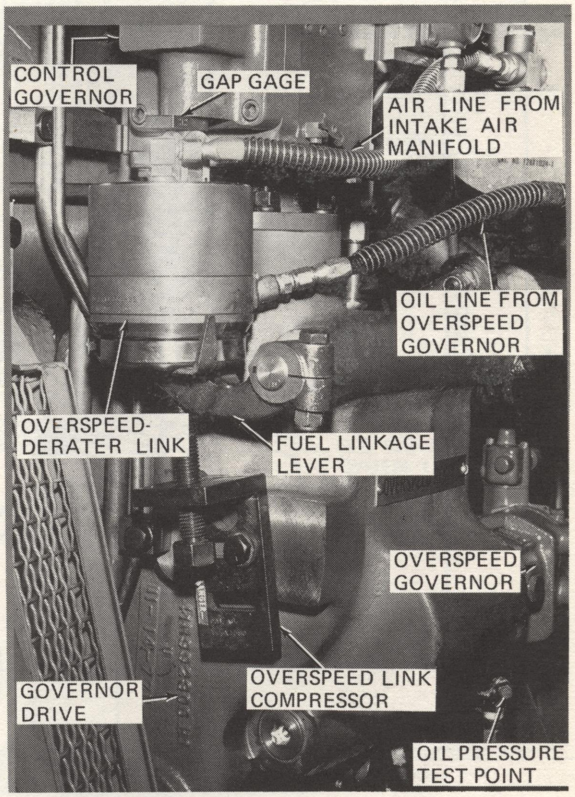

FIG. 1. OVERSPEED-DERATER LINK WITH ENGINE SHUT DOWN AND RACK-SETTING TOOLS APPLIED.

Three designs of links have been used. While the principles of operation are the same in all three designs, each succeeding design has minor mechanical changes which improve the operation and reliability of the link.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

Verify numbers for parts, tools, or material by using the Renewal Parts or Tool Catalogs, or contact your General Electric representative for assistance. Do not order from this publication.

For Parts See
GEG-16251

GENERAL ELECTRIC

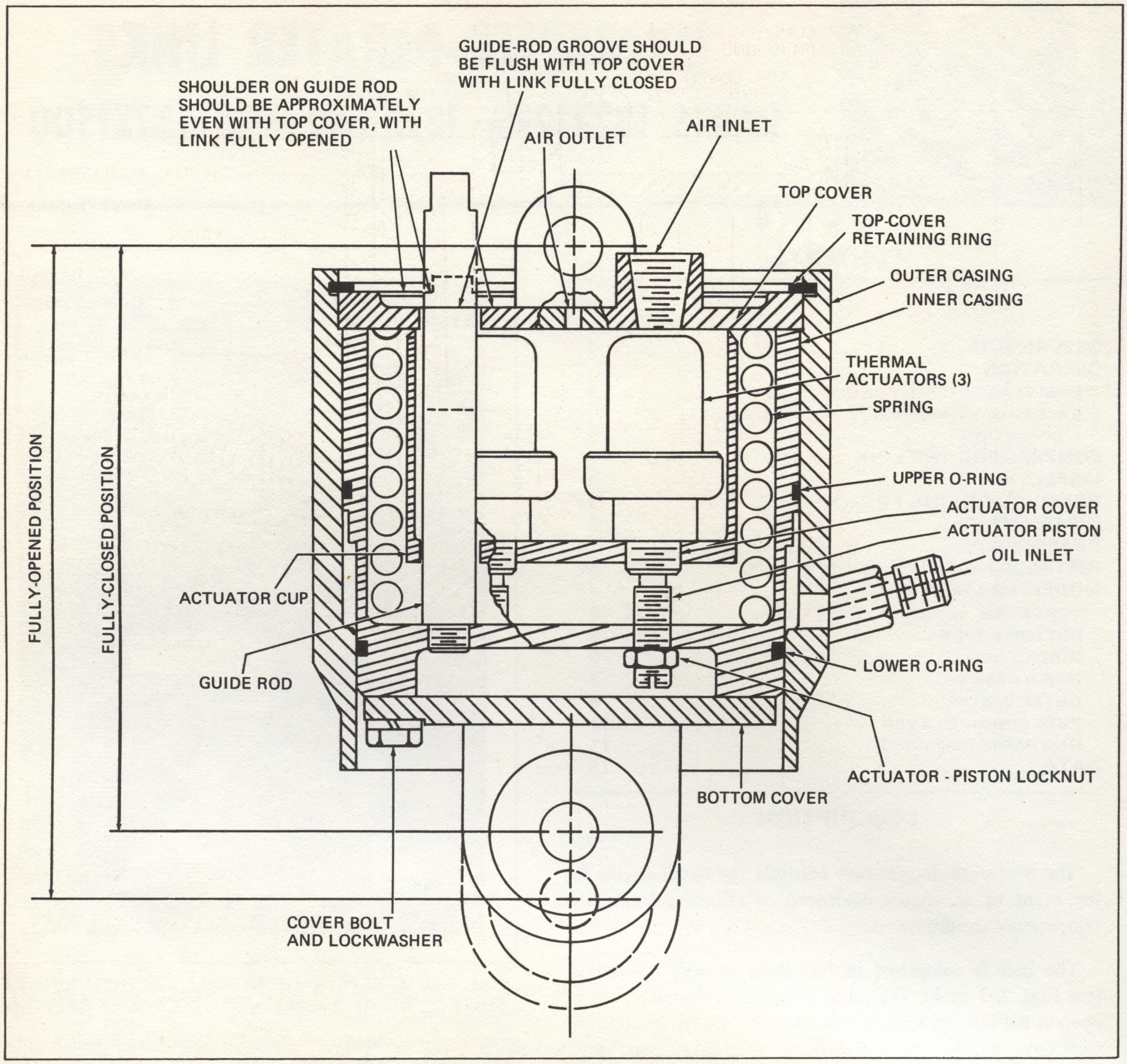
GUIDE-ROD GROOVE SHOULD BE FLUSH WITH TOP COVER WITH LINK FULLY CLOSED
SHOULDER ON GUIDE ROD SHOULD BE APPROXIMATELY EVEN WITH TOP COVER, WITH LINK FULLY OPENED
AIR OUTLET
AIR INLET
TOP COVER
TOP-COVER RETAINING RING
OUTER CASING
INNER CASING
THERMAL ACTUATORS (3)
SPRING
UPPER O-RING
ACTUATOR COVER
ACTUATOR PISTON
OIL INLET
ACTUATOR CUP
GUIDE ROD
LOWER O-RING
ACTUATOR - PISTON LOCKNUT
BOTTOM COVER
COVER BOLT AND LOCKWASHER
FULLY-OPENED POSITION
FULLY-CLOSED POSITION

FIG. 2, E-14949A

FIG. 2. CUTAWAY VIEW OF OVERSPEED-DERATER LINK, DESIGN 1.

The three designs will be identified in the following text as Design 1, Design 2 and Design 3.

Design 1 links (prior to mid-1973) had a grooved guide rod, Fig. 2. When this link is fully closed, the guide-rod groove can be observed flush with the top surface of the top cover.

Design 2 links (mid-1973 to late-1977) had a lug attached to the bottom cover, Fig. 3. When this link is fully closed, the bottom face of the lug and the bottom face of the outer casing are nearly flush.

Design 3 links (after late-1977) have an indicator attached to the bottom cover, Fig. 4. When this link is fully closed, the top edge of the indicator will be aligned with the lower groove on the outer casing.

Engine intake-manifold air is supplied to the thermal actuators mounted inside the inner casing through a fitting in the outer-casing top cover. Oil from the engine overspeed governor is fed into the space between the inner and outer casings through a fitting located on the side of the outer casing (see Figs. 2, 3 or 4). The device forms a link between the control-governor power piston and the linkage which controls the operation of the fuel-injection pumps, Fig. 6.

FIG. 3, E-21095

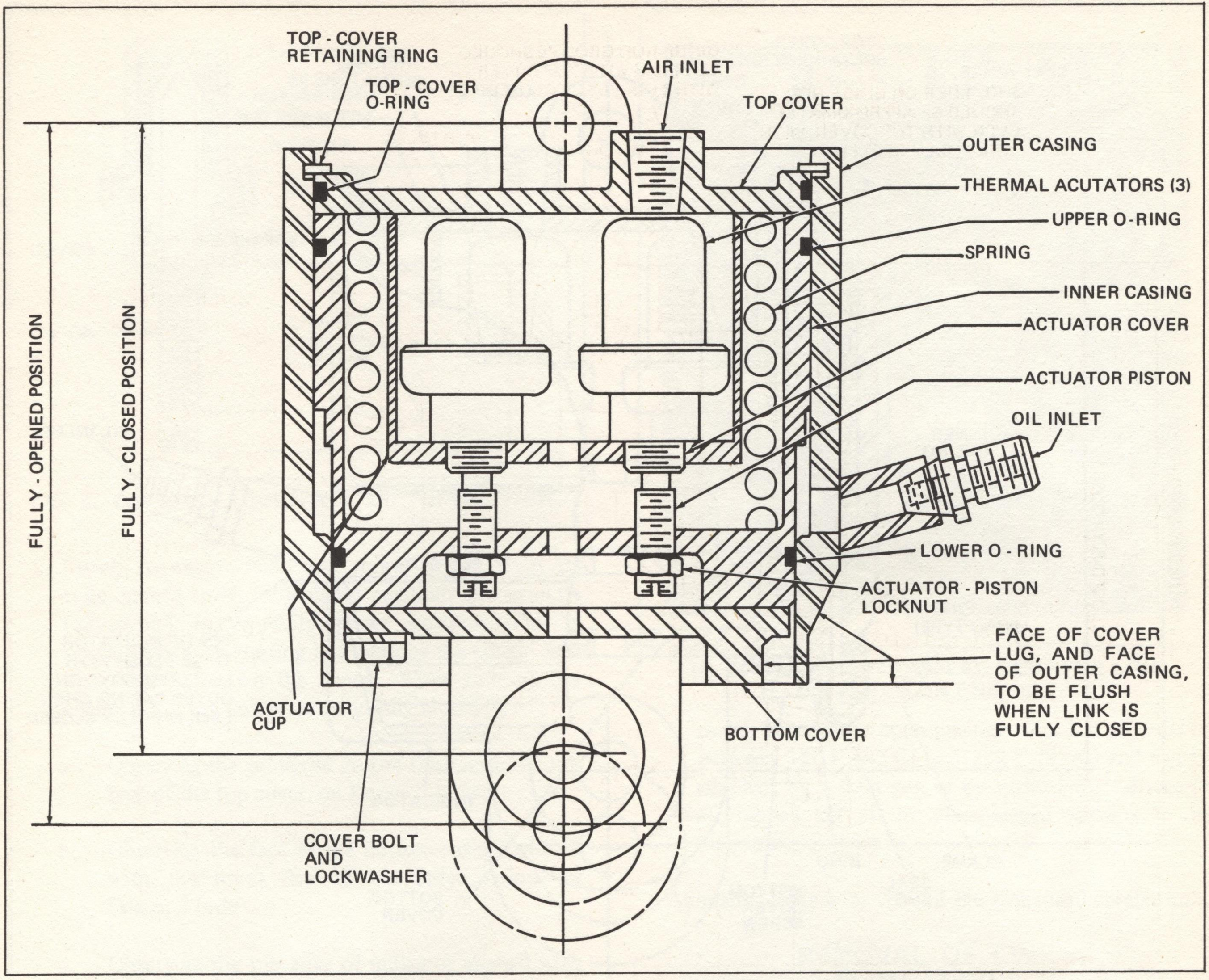
TOP - COVER RETAINING RING
TOP - COVER O-RING
AIR INLET
TOP COVER
OUTER CASING
THERMAL ACUTATORS (3)
UPPER O-RING
SPRING
INNER CASING
ACTUATOR COVER
ACTUATOR PISTON
OIL INLET
FULLY - OPENED POSITION
FULLY - CLOSED POSITION
LOWER O - RING
ACTUATOR - PISTON LOCKNUT
FACE OF COVER LUG, AND FACE OF OUTER CASING, TO BE FLUSH WHEN LINK IS FULLY CLOSED
ACTUATOR CUP
BOTTOM COVER
COVER BOLT AND LOCKWASHER

FIG. 3. CUTAWAY VIEW OF OVERSPEED-DERATER LINK, DESIGN 2.

OPERATION

In normal engine operation, oil pressure from the overspeed governor pump is supplied to the link during the engine cranking cycle and thereafter while the engine is running. The oil pressure being opposed to, and greater than, the pressure exerted by the compressed spring (Figs. 2, 3 or 4) causes the device to move to, and remain in, the closed position. In its closed position, the device acts as a solid link in the fuel-control linkage during the entire period of normal engine operation.

ENGINE OVERSPEED CONDITION

When an engine overspeeds, the overspeed governor reacts to this excessive speed and cuts off the supply of pressure oil to the overspeed link. The governor also vents the link oil supply back to the engine crankcase. Refer to OVERSPEED GOVERNOR instructions for details concerning governor operation.

Removal of oil pressure from the overspeed link allows the spring to expand and force the inner casing to its fully opened position.

Elongation of the link will, regardless of the position of the control-governor power piston, move the fuel control linkage and the fuel injection pump racks to a position which reduces the input fuel to the degree that the engine shuts down.

EXCESSIVE INTAKE-AIR TEMPERATURE CONDITION

The derater portion of the link improves engine combustion efficiency by reducing fuel input when excessively hot (low oxygen content) intake manifold air is supplied to the cylinders.

Intake manifold air is supplied continuously to the link. This air enters the link thru the top cover and fills the cavity containing the three thermal actuators. In old-design

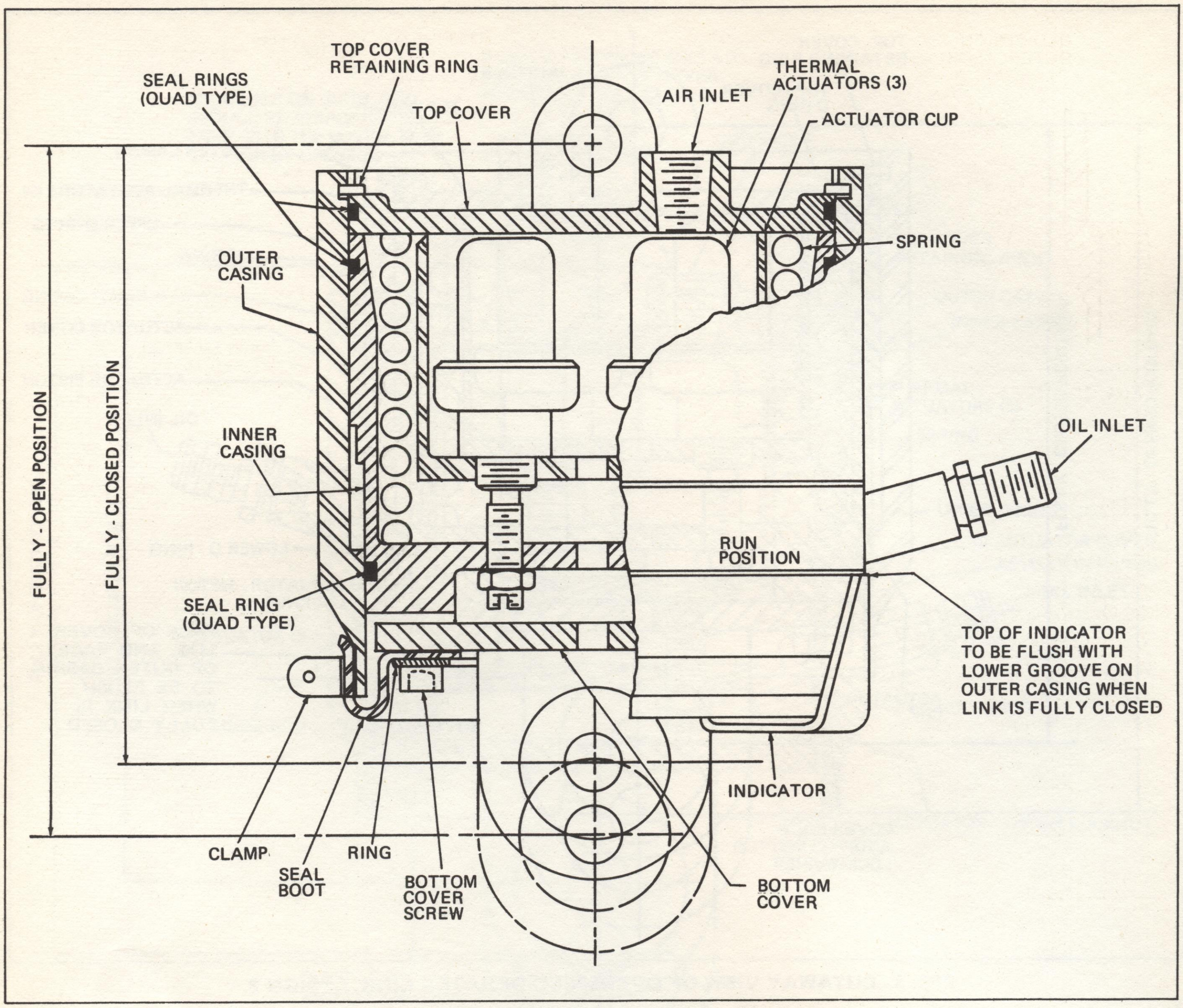
TOP COVER RETAINING RING
SEAL RINGS (QUAD TYPE)
TOP COVER
AIR INLET
THERMAL ACTUATORS (3)
ACTUATOR CUP
SPRING
OUTER CASING
FULLY - OPEN POSITION
FULLY - CLOSED POSITION
INNER CASING
OIL INLET
RUN POSITION
SEAL RING (QUAD TYPE)
TOP OF INDICATOR TO BE FLUSH WITH LOWER GROOVE ON OUTER CASING WHEN LINK IS FULLY CLOSED
INDICATOR
CLAMP
RING
SEAL BOOT
BOTTOM COVER SCREW
BOTTOM COVER

FIG. 4. CUTAWAY VIEW OF OVERSPEED-DERATER LINK, DESIGN 3.

FIG. 4, E-24769

links this air leaves the link thru a small hole in the top cover; in new-design links this air leaves the link thru a series of small holes in the actuator cup, the inner casing and the bottom cover.

If the engine intake air exceeds 180 F (82 C), the metal-wax material in each actuator, Fig. 5, expands and forces the actuator piston out from its position inside the actuator. The three actuator pistons are secured to the inner casing, and the downward force of the pistons combined with the force of the compressed spring, overcomes the upward force created by the oil pressure acting on the inner casing. As the inner casing moves downward, the link elongates and regardless of the position of the control-governor power piston, moves the fuel-control linkage and the fuel injection pump racks to reduce the amount of fuel supplied to the cylinders.

Derater action will vary as the intake-air temperature varies between the limits specified in the DATA section.

COMPRESSING THE LINK

When necessary to perform this operation, refer to instructions given in FUEL PUMP RACK SETTINGS under Tab DE-8.

INSPECTION

At periodic locomotive inspection:

1. Check to ensure that air and oil supply connections are tight, and hoses are free of leaks.

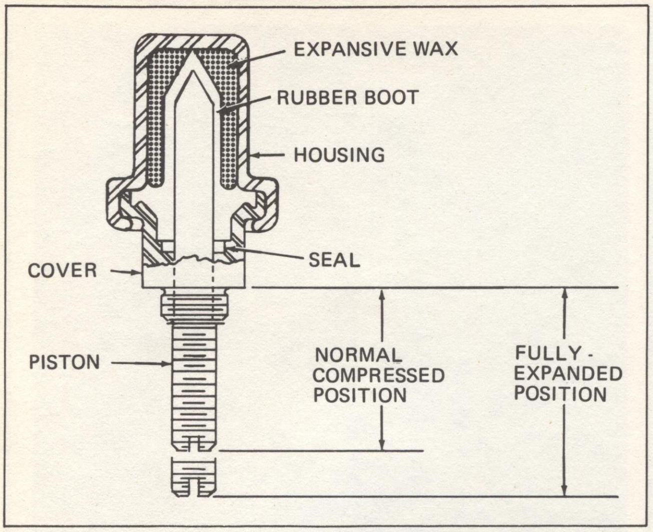
EXPANSIVE WAX
RUBBER BOOT
HOUSING
COVER
SEAL
PISTON
NORMAL COMPRESSED POSITION
FULLY-EXPANDED POSITION

FIG. 5. THERMAL ACTUATOR, SECTIONAL VIEW.

FIG. 5, E-21097

2. Check to ensure that link moves freely from its fully-opened to its fully-closed position, and from its fully-closed to its fully-opened position. This is accomplished by starting and running the engine, and then shutting down the engine. While running the engine note that link is actually fully closed by:

   a. Observing the guide-rod groove flush with the top face of the top cover, on Design 1 links

   b. Observing the face of the bottom-cover lug flush with the lower face of the outer casing, on Design 2 links

   c. Observing the top edge of indicator aligned with the lower groove on the outer casing, on Design 3 links.

   Failure of the link to fully close could be caused by:

   a. Failed O-rings. Look for lube-oil leakage at the I.D. of the outer casing, or for lube oil in the discharge air

   b. Low inlet oil pressure. Install a 300-psi pressure gage in the oil inlet line at the link. Start the engine and observe the inlet pressure which should be about 200 psi. Lack of sufficient pressure could be caused by faulty O-rings in the link, or a faulty relief valve or pump in the overspeed governor.

3. Check the derater action of the link. This is accomplished with the engine running by disconnecting the air inlet hose at the link, supplying hot air into the link, and observing that the link moves toward the open position. The hot air must be between 180 F (82 C) and 202 F (94 C) and can be supplied by a heat gun or by turbocharger discharge air tapped off at the pipe-plugged opening at the intercooler air inlet.

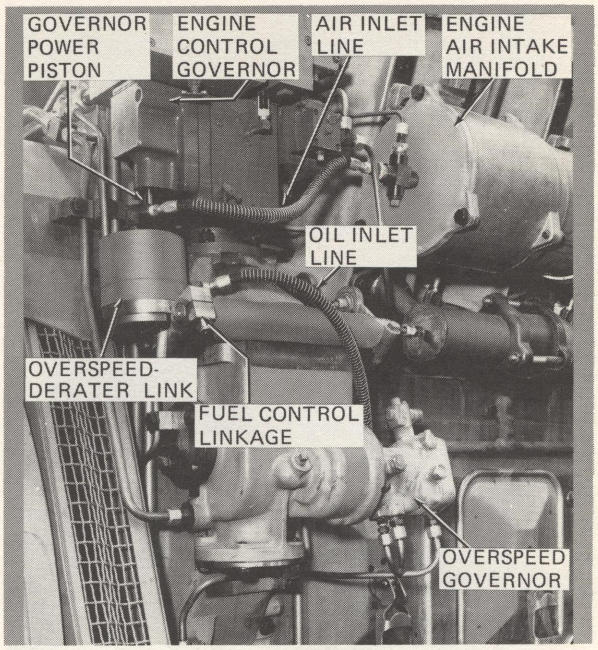
GOVERNOR POWER PISTON
ENGINE CONTROL GOVERNOR
AIR INLET LINE
ENGINE AIR INTAKE MANIFOLD
OIL INLET LINE
OVERSPEED-DERATER LINK
FUEL CONTROL LINKAGE
OVERSPEED GOVERNOR

FIG. 6. VIEW OF OVERSPEED-DERATER LINK MOUNTED ON ENGINE.

FIG. 6, E-14950A

Annually, replace or rebuild the overspeed-derater link.

REMOVAL OF LINK FROM ENGINE

With the engine shut down:

1. Disconnect the air and oil lines at the link, Fig. 6.

2. Remove the cotter pins and clevis pins which connect the link to the control governor and the fuel-control linkage.

3. Remove the 90-degree fitting from the air inlet in the top cover of the link.

DISASSEMBLY

1. On Design 1 and 2 links, remove the bottom cover bolts and lockwashers, then remove the bottom cover from the inner casing. On Design 3 links, remove the indicator, the seal-boot clamp, the four bottom cover screws, the seal-boot ring and seal boot, then remove the bottom cover from the inner casing.

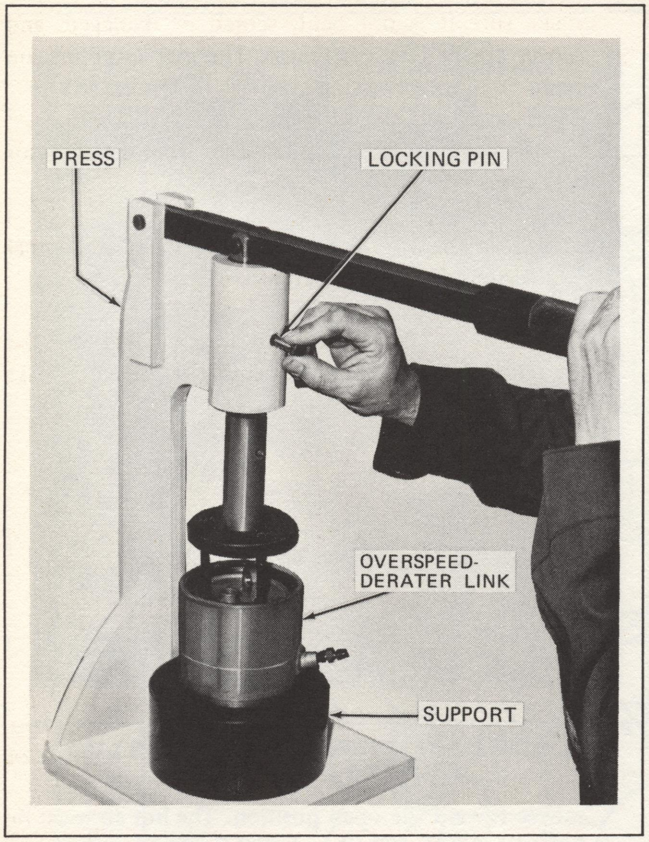
PRESS
LOCKING PIN
OVERSPEED-DERATER LINK
SUPPORT

FIG. 7. DEPRESSING TOP COVER USING FIXTURE PART 147X1917.

FIG. 7, E-20393

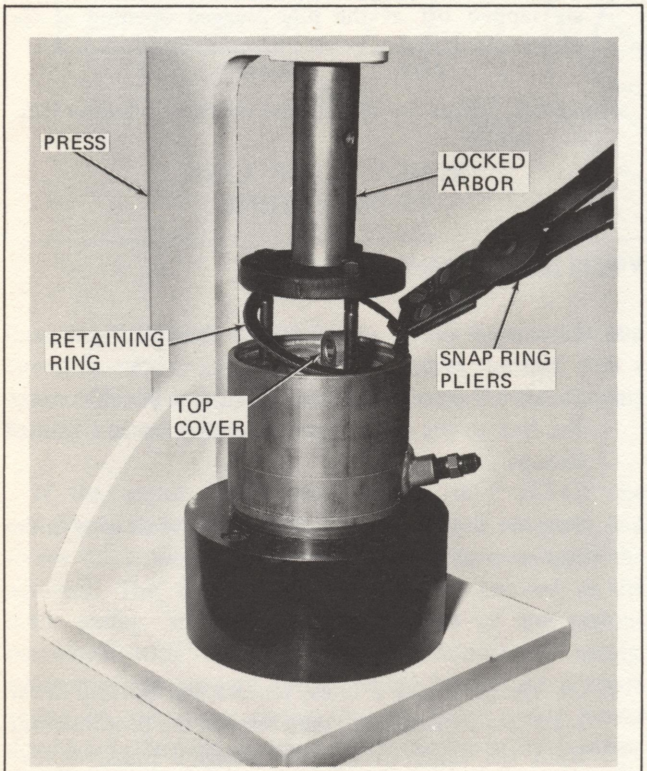
PRESS
LOCKED ARBOR
RETAINING RING
SNAP RING PLIERS
TOP COVER

FIG. 8. REMOVING RETAINING RING USING PLIERS PART 147X1919.

FIG. 8, E-20394

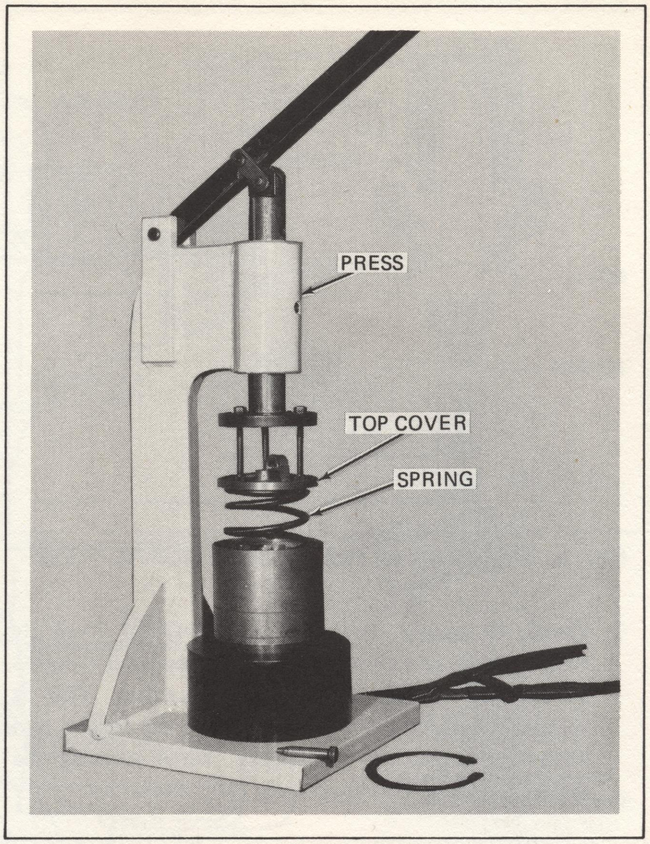
PRESS
TOP COVER
SPRING

FIG. 9. OVERSPEED-DERATER LINK WITH PRESS FORCE REMOVED.

FIG. 9, E-20395

2. Place the link in a press (preferably Part 147X1917 assembly fixture) and support it at the lower part of the outer casing. Apply force to the top cover to slightly compress the spring and allow removal of the top cover retaining ring. Use snap-ring pliers Part 147X1919. See Figs. 7 and 8.

3. Slowly release the force on the top cover and allow the spring to expand to its normal length, Fig. 9. Remove top cover and spring.

CAUTION: *Use extreme care when releasing the force on the top cover as the enclosed spring is under heavy compression and could cause serious injuries if restraining force were accidentally removed during spring expansion.*

4. Push the inner casing with attached actuator cup and thermal actuators out through the top of the outer casing. If these parts are bound, use the assembly fixture Part 147X1917 to press the inner casing out of the outer casing, Fig. 10.

FIG. 10, E-21450

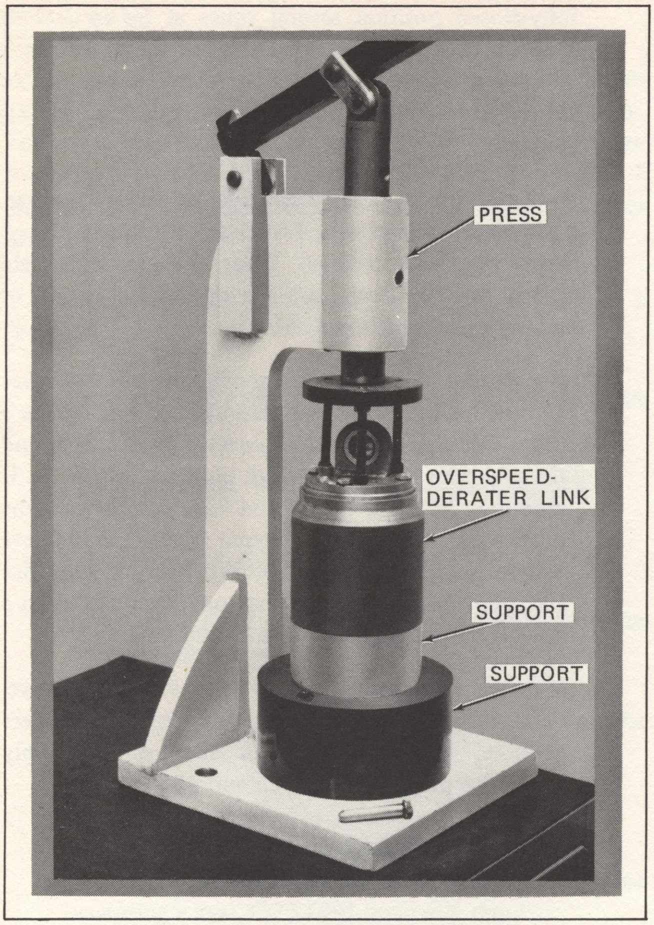

FIG. 10. PRESSING INNER CASING FROM OUTER CASING USING FIXTURE PART 147X1917.

5. Separate the actuator cup along with the three thermal actuators from the inner casing in the following manner:

   a. Remove the three actuator piston locknuts

   b. Alternately turn each actuator piston clockwise two or three turns and repeat until all three pistons are disengaged from the inner casing.

NOTE: *Do not separate the actuator piston from its actuator since these parts are calibrated as a set.*

6. Discard all O-rings.

7. Clean all parts in petroleum spirits. When cleaning the thermal actuators take special care to prevent the spirits from entering the actuators. This can be done by leaving the pistons in their actuators while cleaning.

8. Do not remove the thermal actuators from the actuator cup. Instead, check each actuator piston and make sure it is not bent, scored or damaged, and moves freely in its actuator. Thermal actuators are replaced in the following manner:

   a. Remove the defective actuator from the actuator cup.

   b. Clean the 1/2 in.-20 threads on the new thermal actuator and in the actuator cup.

   c. Apply a few drops of Loctite* 271 to the actuator threads and assemble it finger tight in the actuator cup.

NOTE: *For improved operation and longer life, Parts 132X1273 and 132X1350 links should be modernized to the functional equivalent of Part 132X1500 links prior to reassembly. See MODERNIZATION section in this publication.*

REASSEMBLY

Before reassembly, be sure parts are clean and free of dirt, nicks, scratches and burrs.

1. If the guide rod (Design 1 only) or thermal actuators were removed from the actuator cup, clean all threads, apply a few drops of Loctite 271 to the male thread and assemble the rod and actuators finger tight in the cup.

2. Install the actuator cup (with actuators and guide rod) in the inner casing in the following manner:

   a. Wipe off each actuator piston with a clean tissue, apply about 0.1 gram of DC-11** silicone grease to the tip of the piston, and reassemble the piston in its thermal actuator.

   b. Position the actuator cup inside the inner casing and align the actuator pistons with the three tapped holes in the inner casing.

   c. Alternately turn each actuator piston counterclockwise two or three turns and engage the threaded holes. Continue to turn all pistons until about 11/32 in. of thread is exposed below the lower, counterbored face of the inner casing.

   d. Assemble a locknut on each actuator piston but do not tighten at this time. Piston will be adjusted and locked in a later operation.

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*Product of Loctite Corp.
**Product of Dow-Corning Corp.

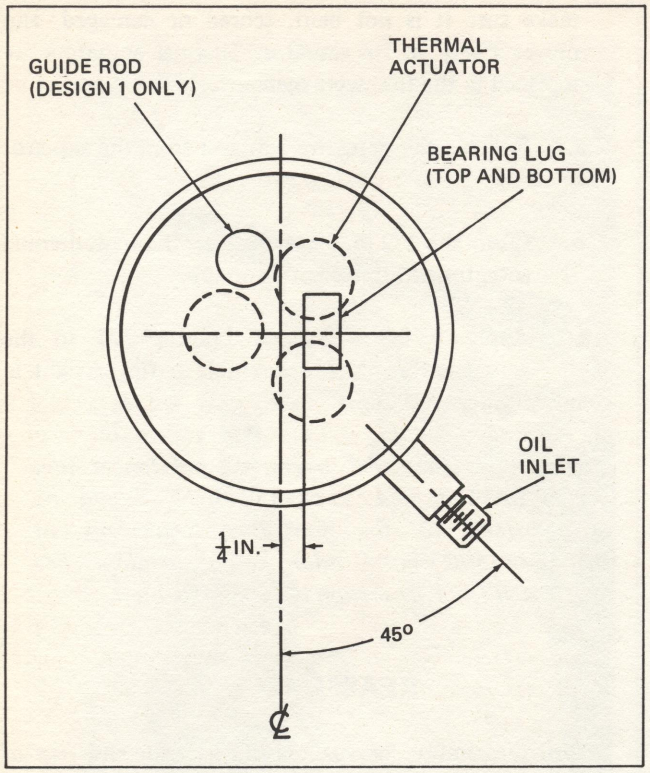


FIG. 11. TOP VIEW OF OVERSPEED-DERATER LINK.

FIG. 11, E-21440

3. Install new quad seal rings in the grooves of the inner casing.

4. Lightly coat all internal surfaces with corrosion preventative, Part 147X1615. Slowly install the inner casing into the outer casing. Be careful not to pinch, cut or roll the seal rings. On the Design 1 link only, orient the parts as shown in Fig. 11.

5. Insert the spring in place between the inner and outer casing.

6. On Design 2 links only, install a new O-ring in the groove in the top cover; on Design 3 links, install a new quad seal ring in the top-cover groove.

7. Position the assembly in a press and support it at the lower part of the outer casing. See Figs. 7, 8 and 9. Position the top cover on the spring and orient the parts as shown in Fig. 11. Apply pressure to top cover to compress the spring and carefully engage the top cover into the outer casing. Lock the arbor in position with the locking pin, and install the retaining ring in the groove in the outer casing.

8. Using SAE 10W-30 lubricating oil, apply hydraulic pressure to the oil inlet fitting. The link should begin to close at 60 psi and should be fully closed at no more than 170 psi. Operate link from fully-opened to fully-closed position several times at up to 300 psi pressure to ensure free movement of the inner casing in the outer casing. Apply 300 psi pressure and hold for five minutes. No leakage at O-rings or seal rings is permitted.

9. With the inner casing tight against the top cover, tighten each piston with 4-6 lb.-in. of torque and lock in position with locknut. Inner casing can be held against the top cover using a mechanical press, or hydraulically (see Step 8 above).

10. For Design 1 and 2 links, assemble the bottom cover and secure with bolts and lockwashers. For Design 3 links, assemble the bottom cover, the seal boot and the seal-boot ring; secure with bottom-cover bolts. If required, install a round rod through the bearing bore and rotate the bottom cover to achieve alignment with the top cover bearing lug. See Fig. 11. After aligning the bottom cover of Design 3 links, apply the seal-boot clamp and the indicator.

11. If link is to be stored, apply corrosion preventative, Part 147X1615, to all external surfaces and, where possible, to the internal surfaces. Also, apply protective plug and cap to air and oil inlets.

INSTALLATION OF LINK ON ENGINE

1. Install the 90-degree fitting in the air inlet in the top of the link.

2. Position the link and install the clevis pins which connect the link to the control governor and the fuel-control linkage. Secure clevis pins with new cotter pins.

3. Connect the air and oil lines to the links.

4. Check the fuel injection pump rack settings and make adjustments as required. See FUEL PUMP RACK SETTINGS under Tab DE-8.

5. Start the engine and check for proper operation of the link. Also check for leakage at the hose connections and the I.D. of the outer casing.

MODERNIZATION

The following instructions apply to Design 1 links, Part 132X1273, and Design 2 links, Part 132X1350, which will, after the parts are replaced or modified per the following detailed instructions, be the functional equivalent of Design 3 links, Part 132X1500.

The following instructions apply to disassembled parts.

TOP COVER

The top cover of a Design 3 link has no holes but does have a groove to accept a Part 132X1491 quad seal ring. The cover of a Design 2 link has no holes but has a groove to accept a Part 115X2262 O-ring. The cover of a Design 1 link has two holes and no groove for an O-ring or quad seal ring.

Modification of top cover, Design 1 to Design 3 (Fig. 12):

1. Make press-fit plugs for the following existing holes in the cover:
   a. The 9/16 in. diameter hole for the guide rod
   b. The 1/4 in. diameter hole for air venting.
2. Thoroughly clean the press-fit contact surfaces in the cover and on the plugs.
3. Apply a few drops of Loctite 271 to the press-fit surfaces of the plugs.
4. Press plugs into holes in cover.
5. (Optional) Machine groove in the cover O.D. for accepting a Part 132X1491 quad seal ring.

Modification of top cover, Design 2 to Design 3 (Fig. 12):

Remachine groove in the cover O.D. for accepting a Part 132X1491 quad seal ring. This is an optional operation; if not performed, continue to apply a Part 115X2262 O-ring.

BOTTOM COVER

The conversion of Design 1 and 2 bottom covers to Design 3 bottom covers is not practical and therefore a new cover, Part 132X1494, should be used. However, it is possible to modify a Design 1 cover to a Design 2 cover using the following procedure:

1. Refer to Fig. 13 and, using the Design 1 cover:
   a. Drill one 1/4-in. diameter hole
   b. Drill and ream one 0.375/0.374-in. diameter hole.
2. Make lug to dimensions given in the illustration
3. Assemble lug in position in the cover and secure with:
   a. A 1/8-in. fillet weld as shown in the illustration, or
   b. Two tack welds at opposite sides of the lug.
4. Machine the lug to the 0.780/0.775-in. dimension shown in the illustration.

GUIDE ROD

Remove guide rod from inner casing and discard. The guide-rod holes in the inner casing and actuator cup, together with the hole drilled in the bottom cover, will serve as air passages for discharge air.

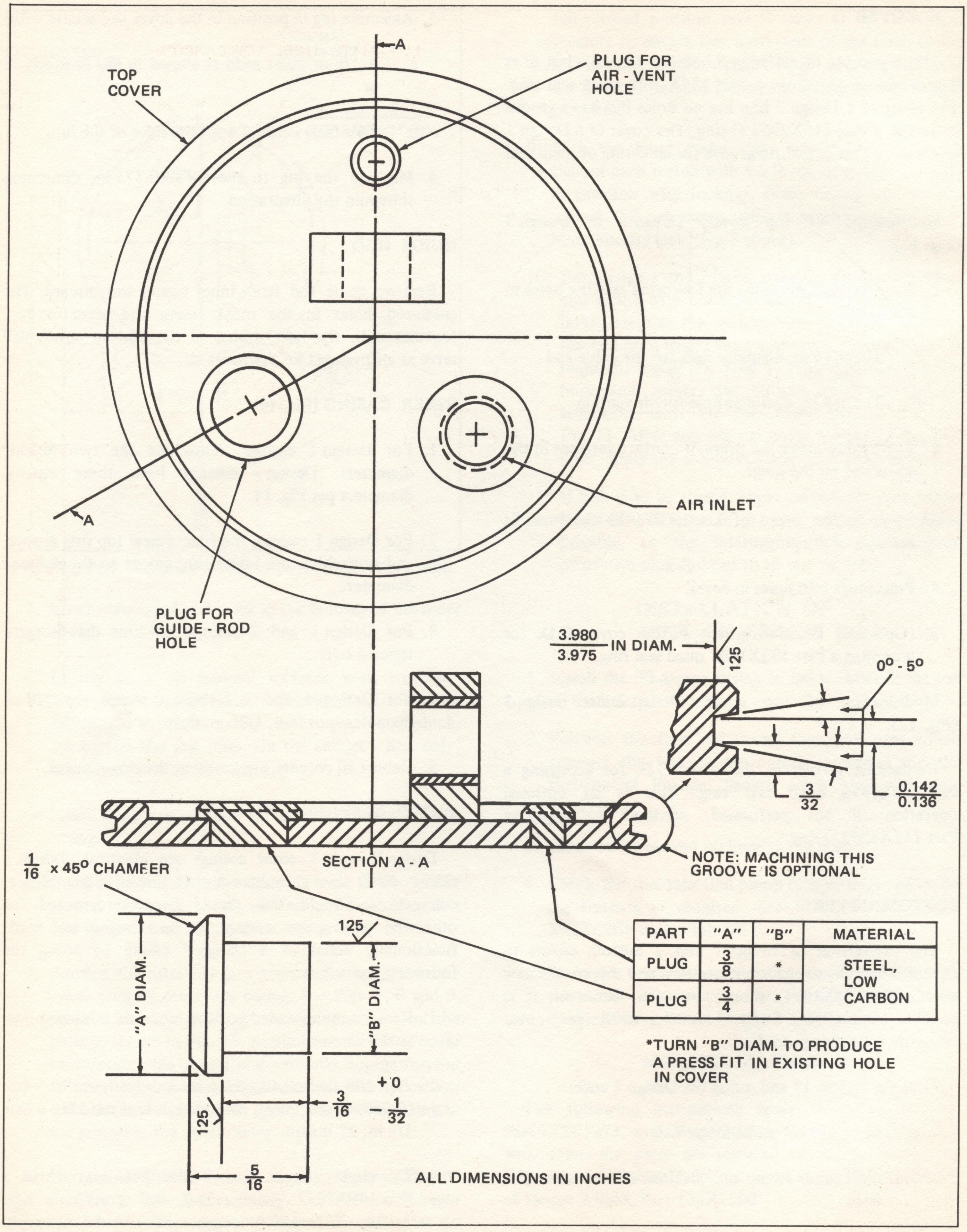
INNER CASING (Fig. 14)

1. For Design 1 casings, remachine the two outside diameters. Design 2 casings have these outside diameters per Fig. 14.
2. For Design 1 casings, machine a new top ring groove, and remachine the lower ring groove to the reduced diameter.
3. For Design 1 and 2 casings, machine the 5-degree tapered bore.
4. For Design 1 and 2 casings, machine the 5/8 in. diameter spot face, 1/16 in. deep.
5. Deburr all corners, especially at the ring grooves.

OUTER CASING (Fig. 15)

Design 2 and 3 outer casings are identical. Design 1 casings differ since they have a male thread at the oil-inlet connection. Should this thread become damaged, an otherwise good outer casing can be salvaged and made functionally equal to a Design 3 casing by using the following procedure:

1. Remove the threaded portion of the oil inlet as shown in the illustration.
2. Tap drill the existing 3/16-in. hole with an “R” drill (0.339-in. diameter), countersink hole, and tap a new 1/8 in.-27 thread.
3. Thoroughly clean the oil-inlet hole and install a Part 140X2071 fitting. This will provide a new 7/16 in.-20 thread for engagement with the oil-supply hose.


A
TOP COVER
PLUG FOR AIR - VENT HOLE
A
AIR INLET
PLUG FOR GUIDE - ROD HOLE
3.980 / 3.975 IN DIAM.
125
0° - 5°
3/32
0.142 / 0.136
SECTION A - A
NOTE: MACHINING THIS GROOVE IS OPTIONAL
1/16 x 45° CHAMFER
"A" DIAM.
125
"B" DIAM.
+0
3/16 − 1/32
125
5/16
3/16
ALL DIMENSIONS IN INCHES

PART	"A"	"B"	MATERIAL
PLUG	3/8	*	STEEL, LOW CARBON
PLUG	3/4	*	

*TURN "B" DIAM. TO PRODUCE A PRESS FIT IN EXISTING HOLE IN COVER

FIG. 12. TOP COVER MODIFICATIONS, DESIGN 1 TO DESIGN 3.

FIG. 12, E-21441

FIG. 13, E-21442

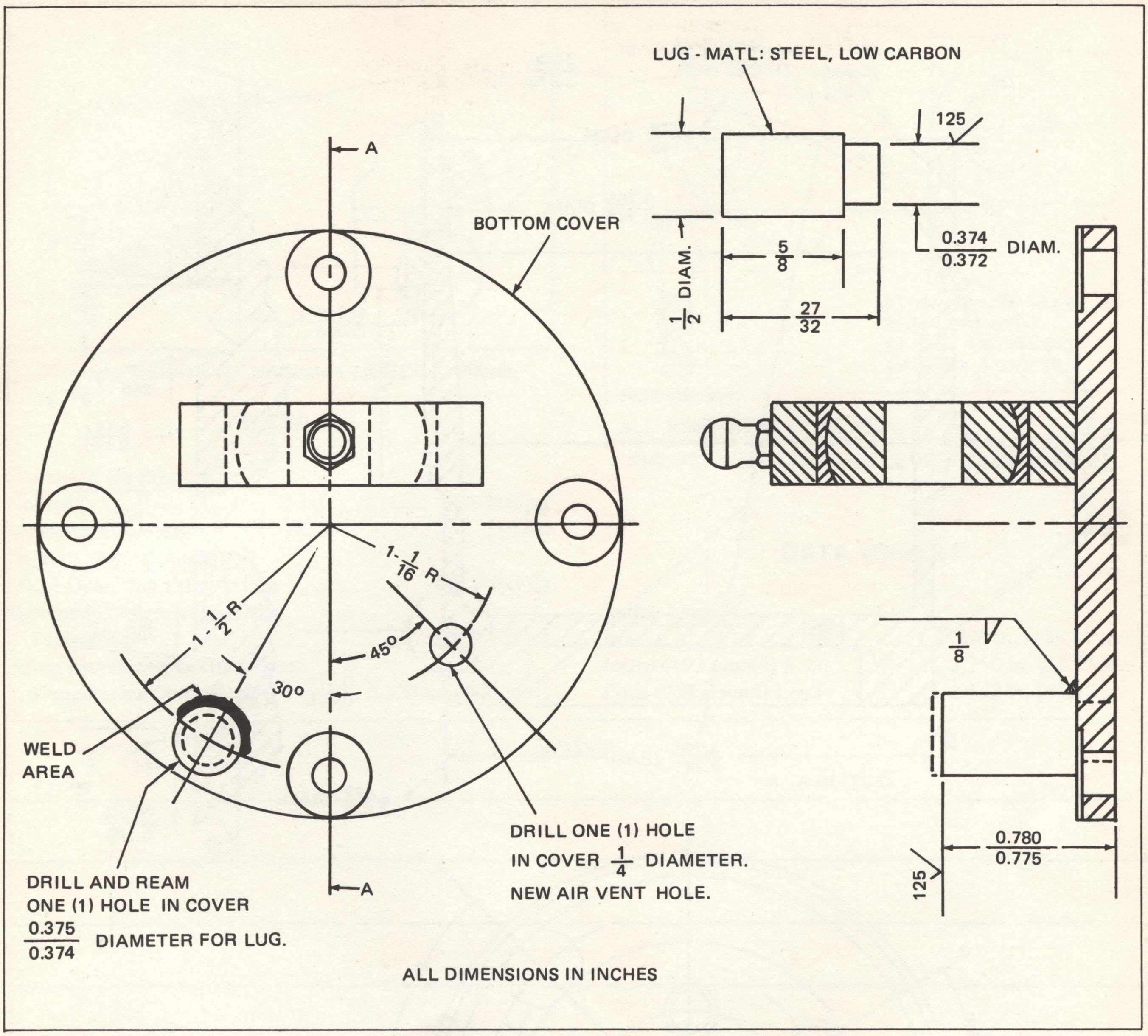

LUG - MATL: STEEL, LOW CARBON
125
A
BOTTOM COVER
1/2 DIAM.
5/8
27/32
0.374/0.372 DIAM.
1-1/16 R
1-1/2 R
45°
30°
1/8
WELD AREA
DRILL ONE (1) HOLE IN COVER 1/4 DIAMETER. NEW AIR VENT HOLE.
0.780/0.775
125
A
DRILL AND REAM ONE (1) HOLE IN COVER 0.375/0.374 DIAMETER FOR LUG.
ALL DIMENSIONS IN INCHES

FIG. 13. BOTTOM COVER MODIFICATIONS, DESIGN 1 TO DESIGN 2.

FUEL LINKAGE LEVER

Design 3 links must always be used with a Part 132X1270-2 fuel linkage lever. See Fig. 1. Provide a new Part 132X1270-2 lever or convert Part 132X1270 levers to Part 132X1270-2 levers by machining the additional required clearance shown on Fig. 16.

NEW PARTS REQUIRED

In addition to modifying the parts outlined previously, when converting Design 1 and 2 links to Design 3 links, it will be necessary to have the following additional parts. Refer to Renewal Parts List GEG-16251.

Part No.	Quantity	Description
132X1491	2	Ring, quad seal, for upper inner casing groove and top cover
132X1492	1	Ring, quad seal, for lower inner casing groove
132X1494	1	Cover, bottom
N170AP21010	4	Screw, bottom cover
115X2399	1	Boot, seal
115X2395	1	Ring, for seal boot
115X2396	1	Indicator
N22P21008	2	Screw, indicator
N405P71	2	Lockwasher, indicator screw

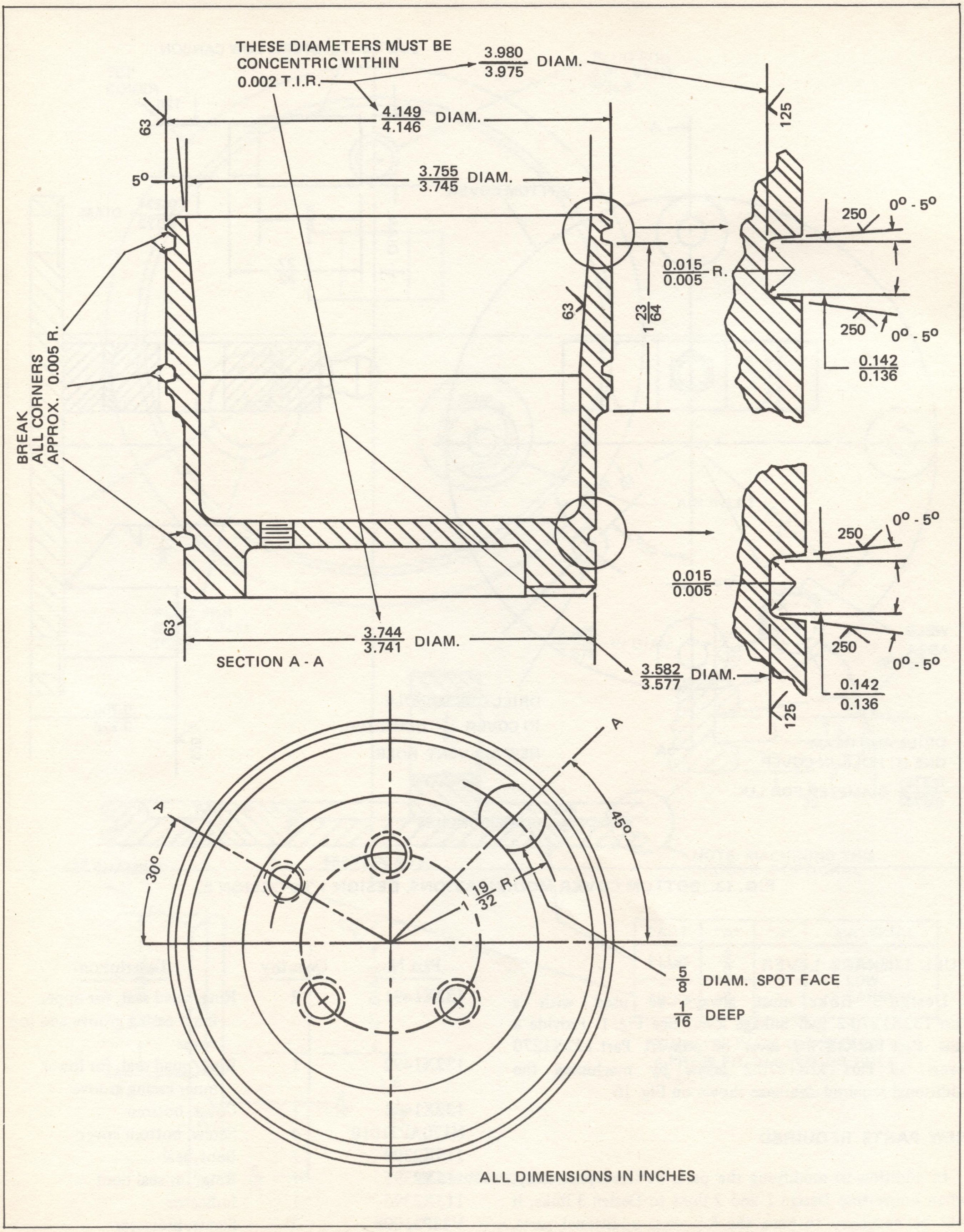

THESE DIAMETERS MUST BE CONCENTRIC WITHIN 0.002 T.I.R.
3.980 / 3.975 DIAM.
125
63
4.149 / 4.146 DIAM.
5°
3.755 / 3.745 DIAM.
250
0° - 5°
0.015 / 0.005 R.
63
1 23/64
250
0° - 5°
0.142 / 0.136
BREAK ALL CORNERS APPROX. 0.005 R.
250
0° - 5°
0.015 / 0.005
250
0° - 5°
0.142 / 0.136
63
3.744 / 3.741 DIAM.
SECTION A - A
3.582 / 3.577 DIAM.
125
A
A
45°
30°
1 19/32 R.
5/8 DIAM. SPOT FACE
1/16 DEEP
ALL DIMENSIONS IN INCHES

FIG. 14, E-21443

FIG. 14. INNER CASING MODIFICATIONS, DESIGN 1 AND 2 TO DESIGN 3.

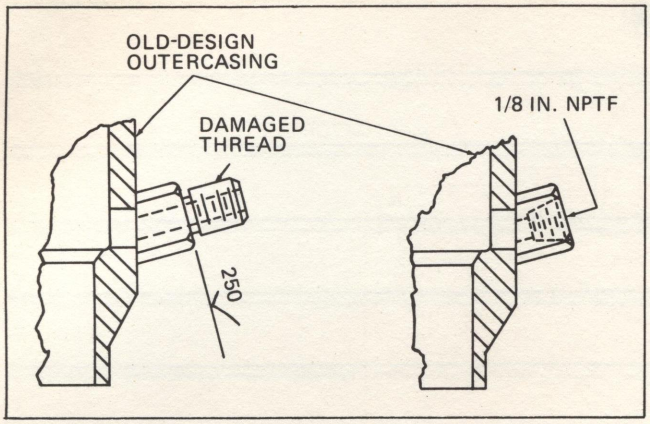

OLD-DESIGN OUTERCASING
DAMAGED THREAD
1/8 IN. NPTF
250

FIG. 15. REPAIR OF DESIGN 1 OUTER CASING.

FIG. 15, E-21444

DATA

Overspeed Oil Pressure	
Normal	190-210 psi
Minimum Operating	150 psi
Derater Thermal Actuators	
Initial Operating Temperature	180 F (82 C)
Maximum Designed Operating Temperature	202 F (94 C)
Piston Movement, Initial to Max. Temperature (minimum)	0.320 in. (8,13 mm)

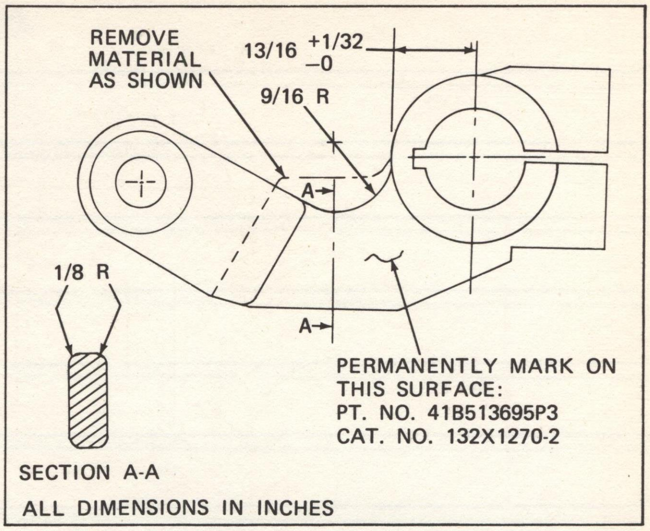

REMOVE MATERIAL AS SHOWN
13/16 +1/32 −0
9/16 R
A
A
1/8 R
PERMANENTLY MARK ON THIS SURFACE:
PT. NO. 41B513695P3
CAT. NO. 132X1270-2
SECTION A-A
ALL DIMENSIONS IN INCHES

FIG. 16. FUEL LINKAGE LEVER MODIFICATION.

FIG. 16, E-24777

DATA (Cont'd.)

Spring Lengths	
Free	7.290 in. (185,17 mm)
Initial (193 pound) Load	3.250 in. (82,55 mm)
Final (225 pound) Load	2.562 in. (65,07 mm)

NOTES: